

Name _____ Period _____

Gene Expression Practice Worksheet

Part 1 – Vocabulary Practice, complete on separate paper for submission.

1. Contrast transcription & translation.
2. Contrast a gene & a chromosome.
3. Describe how transcription factors are relevant to differential gene expression.
4. Explain the role of a TATA box in transcription.
5. Describe the directionality requirement of RNA polymerase.
6. Contrast a coding strand & a template strand.
7. Explain the relationship between: DNA, mRNA & Transcription.
8. Contrast the transcription termination events among prokaryotes & eukaryotes.

Part 2 – Transcription Application Practice, complete on separate paper for submission.

For the DNA sequences below, complete the numbered tasks on separate paper.

5' C A T G C C A T A C G G C A T 3' (Top DNA Strand)

3' G T A C G G T A T G C C G T A 5' (Bottom DNA Strand)

1. Transcribe the top strand and write with the mRNA in the correct directionality that would result as if RNA polymerase transcribed it.
 - a. Which strand was the template strand?
 - b. Which strand was the coding strand?
2. Transcribe the bottom strand and write with the mRNA in the correct directionality that would result as if RNA polymerase transcribed it.
 - a. Which strand was the template strand?
 - b. Which strand was the coding strand?
3. If the mRNA transcribed for a gene has the sequence: 5' AUGCCAUAC 3'...
 - a. Which strand was the template strand?
 - b. Which strand was the coding strand?
4. If the mRNA transcribed for a gene has the sequence: 3' ACGGUA 5'...
 - a. Which strand was the template strand?
 - b. Which strand was the coding strand?

Part 3 – Post-Transcriptional Modification Application Practice, complete on separate paper for submission.

1. What are the 2 modifications the pre-mRNA will undergo before splicing?
2. For the pre-mRNA sequence below: write out the entire pre-mRNA sequence, write out the excised introns in the middle of the page and the spliced exons at the bottom of the page. Introns are shown lightly shaded and exons are bold.
3. What complex performs the splicing of mRNA?

5' **G** **C** **C** **A** **A** **U** **G** **C** **C** **A** **U** **G** **C** **C** **C** **A** **A** **U** **G** **G** **G** **A** **G** **A** **A** **A** 3'

Part 4 – Protein Synthesis Basics Review

Complete the flowchart of the basic protein synthesis steps. Note that modifications from part 3 are not shown on this flowchart but you do need to know them.

Part 5 – Translation Practice, complete on separate paper for submission.

1. Translate the mRNA into amino acids: 5' AUGGGAGUACCACGUGCAUUA 3'
2. The sequence below is the coding DNA sequence for a gene. Underlined letters represent introns. Determine the correct template sequence, pre-mRNA, mature mRNA, & amino acid sequence for the protein.

5' GTAGCTACATGTAAGGCCCTTTAGGATCTTCGCAAGGATAGGCATAACCGTTGCAATCCAGG 3'

3. The sequence below is the coding DNA sequence for a gene. Underlined letters represent introns. Determine the correct template sequence, pre-mRNA, mature mRNA, & amino acid sequence for the protein.

3' AAAGTTACATGTAAGGCCCTTTAGGATCTTCGCAAGGATAGGCATAACCGTGTCAATCCAGG 5'